

NOTES ON AN UNUSUALLY FINE SLAB OF FOSSIL CRINOIDS.

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A large slab of fossil crinoids just prepared for the exhibition collections in the Division of Paleontology of the United States National Museum is so unique and of such interest that it seemed to the writer worthy of some special notice. This slab belongs to the unrivaled collection of fossil echinoderms deposited in the National collections by Mr. Frank Springer, who is preparing a monograph upon *Scyphocrinus*, the genus to which the crinoids represented on the slab belong. Mr. Springer has very kindly allowed the writer free use of his notes upon this genus in preparation of the present article.

For over 50 years paleontologists have known of certain bulblike crinoidal or cystoidal bodies in late Silurian and early Devonian rocks. American specimens were described by Hall in 1879 as *Camarocrinus*, but some years before Barrande applied the name *Lobolithus* to similar objects in the Silurian rocks of Bohemia. A large number of these bodies having been accumulated in the collections of the United States National Museum, Prof. Charles Schuchert in 1904 published a full account of them in his paper on "Siluric and Devonian Cystoidea and Camarocrinus."¹ Hall regarded *Camarocrinus* as a large chambered bulb to which was attached a column bearing at its distal extremity a large crinoidal calyx with unknown characters. Schuchert arrived at substantially the same conclusion, believing that "*Camarocrinus* thus appears to be the float of an unknown crinoid that was held together after the death of the individual by the firmly interlocked double walls of the exterior and interior while the crown and stalk dropped away. Under this hypothesis the float drifted with the sea currents, was finally filled with water, and the attenuated end being heavier sank in that position to the sea bottom." Although realizing that the last word had not been said in regard to *Camarocrinus*, this author believed that the supposition that these bodies were anchored in the mud with the stalk directed upward was not in accord with the facts. In Bohemia

¹Smiths. Misc. Coll., vol. 47, 1904, pt. 2, pp. 201-272, 11 pls., 24 figs. No. 1482.

Camarocrinus (*Lobolithus*) is found associated with calices of the crinoid *Scyphocrinus*, and in 1900, Dr. F. A. Bather definitely associated these two genera as parts of one and the same organism.

No association of *Camarocrinus* and *Scyphocrinus* in America had ever been noted, although the *Camarocrinus* occurred frequently in such large numbers as to make up entire limestone layers. In Oklahoma, where these layers sometimes outcrop at the surface, cobblestone-like masses frequently strew the ground in great profusion. Since 1904 Mr. Springer has directed his efforts toward the discovery of new evidence upon *Camarocrinus*, with the result, as announced at the 1912 meeting of the Paleontological Society in New Haven, Connecticut, that he is now able to show, first, that the genus *Scyphocrinus* occurs at several horizons in the late Silurian and early Devonian of America; second, that the *Camarocrinus* bulbs are frequently connected at the distal end of the stem with crinoids belonging to the genus *Scyphocrinus*; and third, that these bulbs usually occur with the stalk end upward and not downward as before supposed. Mr. Springer will publish the evidence for these conclusions later, but a few notes regarding the slab which is the subject of the present article are in order.

During the summer of 1904, as recorded in Schuchert's paper, the present writer observed *Camarocrinus* in the bluffs along the Mississippi River a few miles north of Cape Girardeau, Missouri, in the outcropping edge of a layer with numerous large crinoid stems. In 1911 Dr. E. O. Ulrich found a detached mass of crinoidal limestone from the same layer in which was embedded the well-preserved calyx of a large *Scyphocrinus*. These discoveries were so promising of favorable results that Mr. Springer asked his private collector, Mr. Frederick Braun, to carefully examine this general area in the hope of finding the fossiliferous bed at some place sufficiently exposed for careful collecting. After a protracted search along the bluffs facing the Mississippi River, Mr. Braun finally succeeded in locating the crinoidal layer at a point where he could carry on quarrying operations. Here several weeks' work resulted not only in some most remarkable specimens of crinoid, but in settling finally the facts upon which the interpretation of *Camarocrinus* must depend. The work was of no small difficulty, as the physical obstacles were formidable. The layer could be readily traced but it was not everywhere fossiliferous, and as the crinoids occurred only on the lower side a place had to be found where there was a soft seam underneath along which the fossiliferous stratum would readily separate from the one next below. The fossiliferous part of the layer proved to be limited to a small area which contained the remains of a thickly crowded crinoid colony suddenly killed by some change in the water and embedded in the soft muddy sea bottom without material disturbance by currents.

Four large slabs ranging from 500 to 1,500 pounds weight each and a number of smaller pieces were selected, the whole weighing 4,500 pounds. Two of the slabs fit together, forming a single one of about 4 by 7 feet, containing the most important specimens. This is the slab now on exhibition in the United States National Museum. The remaining specimens have been prepared and form a part of the study series.

The locality was a number of miles distant from any station or landing, and it was necessary to transport lumber to make strong packing cases for the slabs, embedding them in plaster to insure the specimens from injury in handling. A chute was then constructed to slide the cases down with ropes and tackle from a rock levee to the water's edge, about 35 feet distant, where they were shipped on a passing river steamboat. Upon their arrival at the National Museum it was necessary to clear away the adherent clay with fine tools before the specimens could be seen or studied. In addition a large amount of time was consumed in removing the more or less hard calcareous matrix composed of innumerable arm and pinnule joints forced down between the arms of the specimens and firmly cemented by pressure.

The principal slab, of which a portion, one-sixth natural size, is shown on plate 1, contains 18 complete crowns, several of them with the stem attached for part of its length. Some have the calyx fairly rotund, but most of them are considerably flattened and often much distorted by contact with the *Camarocrinus* bulbs noted below. All have the strong, many-branched arms intact and often upward of 12 inches long. Two of the smaller but more complete calices, one-half natural size, are shown on plate 2. Besides these crowns several sets of arms are partly visible, belonging to calices which are entirely buried, either under other individuals or in the limestone matrix, which becomes firm and hard a short distance inward. Some parts of the slab are covered with a dense mass of stems lying parallel like stalks of grain in a sheaf, and many of the crowns lie with their arms pointing in the same direction, as if they had fallen over in the mud at the same time under the common impulse of a gentle current. Intermingled with the crowns and stems forming the chief remaining portion of the crowded surface are numerous *Camarocrinus* bulbs; some of them are well exposed and appear of good size, while in many cases only a part can be seen protruding among the other objects. All of them are considerably flattened and some much fractured from the pressure of the overlying mass of arms of the compact limestone deposit forming the main thickness of the heavy layer.

This slab has been mounted on a flat-topped glass-covered base and has been installed at the west end of the hall of Invertebrate Paleontology. Here the specimen serves a twofold purpose—first, in showing one method of fossilization, and, second, as an introduction to the biologic exhibit of fossil crinoids.